Bundesamt
für Sicherheit in der
Informationstechnik

Technical Guideline TR-03112-2

eCard-API-Framework – eCard-Interface

Version 1.1.5

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Bundesamt für Sicherheit in der Informationstechnik
Postfach 20 03 63
53133 Bonn

E-Mail: ecard.api@bsi.bund.de
Internet: https://www.bsi.bund.de

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1 Overview of the eCard-API-Framework

The objective of the eCard-API-Framework is the provision of a simple and homogeneous interface to enable standardised use of the various smart cards (eCards) for different applications.

The eCard-API-Framework is sub-divided into the following layers:

- Application-Layer
- Identity-Layer
- Service-Access-Layer
- Terminal-Layer

The **Application-Layer** contains the various applications which use the eCard-API-Framework to access the eCards and their associated functions. Application-specific "convenience interfaces", in which the recurring invocation sequences may be encapsulated in application-specific calls, may also exist in this layer. However, these interfaces are currently *not* within the scope of the e-Card-API-framework.

The **Identity-Layer** comprises the eCard-Interface and the Management interface, and therefore functions for the use and management of electronic identities as well as for management of the eCard-API-Framework.

The *eCard-Interface* (refer to [TR-03112-2]) allows to request certificates as well as the encryption, signature and time-stamping of documents.

In the M*anagement-Interface* (refer to [TR-03112-3]), functions for updating the framework and the management of trusted identities, smart cards, card terminals, and default behaviour are available.

The **Service-Access-Layer** provides, in particular, functions for cryptographic primitives and biometric mechanisms in connection with cryptographic tokens, and comprises the ISO24727-3-Interface and the Support-Interface.

The *ISO24727-3-Interface* defined in the present document is a webservice-based implementation of the standard of the same name [ISO24727-3]. This interface contains functions to establish (cryptographically protected) connections to smart cards, to manage card applications, to read or write data, to perform cryptographic operations and to manage the respective key material (in the form of so-called "differential identities"). In the process, all functions which use or manage "differential identities" are parameterised by means of protocol-specific object identifiers so that the different protocols which are defined in the present document MAY be used with a standardised interface (refer to [TR-03112-7]).

The S*upport-Interface* (refer to [TR-03112-5]) contains a range of supporting functions.

The **Terminal-Layer** primarily contains the *IFD-Interface* (refer to [TR-03112-6]). This layer takes over the generalisation of specific card terminal types and various interfaces as well as communication with the smart card. For the user it is unimportant whether the card is addressed by PC/SC, a SICCT terminal or a proprietary interface, or whether it has contacts or is contact-less.

1.1 Key Words

The key words “MUST”, “MUST NOT”, “REQUIRED”, “SHALL”, “SHALL NOT”, “SHOULD”, “SHOULD NOT”, “RECOMMENDED”, “MAY”, and “OPTIONAL” in this document are to be interpreted as described in [RFC2119]. The key word “CONDITIONAL” is to be interpreted as follows:

CONDITIONAL: The usage of an item is dependent on the usage of other items. It is therefore further qualified under which conditions the item is REQUIRED or RECOMMENDED.

1.2 XML-Schema

A XML-Schema is provided together with this Technical Guideline. In case of incongruencies, the specifications in this text take precedence. The graphical representations of the XML-Schema illustrate the schema. Note that the text of this Guideline might further restrict the presence or mulitplicity of elements as compared to the schema definition.

2 Overview of the eCard-Interface

2.1 Objective

The eCard-Interface encapsulates important document related functions of the eCard-API-Framework in an application-orientated manner.

2.2 Functions

The eCard-Interface encapsulates the main functions of the eCard-API-Framework in an application-orientated manner. For this purpose the eCard-Interface provides the following function groups:

- Functions for identity management
- Signature functions
- Encryption functions

With the `GetCertificate` function, certificate applications can be transferred to a certification authority, from where they obtain their certificates.

In addition, the invocations specified by [DSS] can be used for the creation and verification of (qualified) electronic signatures in the formats according to [RFC3275] and [RFC3369], as well as the corresponding extensions from ETSI. This functional group also contains an interface to a trustworthy display component which can be used in particular for the displaying the data and test results requiring a signature.

Finally, with the encryption functions documents can be easily encrypted and decrypted in accordance with [RFC3369] and [XMLEnc] by simple function invocations.

2.2.1 Functions for identity management

- With the GetCertificate function, certificate applications can be transferred to a certification authority, from which certificates are obtained.

2.2.2 Signature functions

- The `SignRequest` function conforms with [DSS], and related profiles and permits the creation of (qualified) electronic signatures in popular high-level formats such as XML-DSig in accordance with [RFC3275], or cryptographic message syntax in accordance with [RFC3369]. These signatures may also contain time stamps, which can also be requested separately with this function.
- The `VerifyRequest` function conforms with [DSS] and related profiles and enables verification of signed objects (e.g. signatures, time stamps, certificates, blacklists).
- Th `ShowViewer` function enables display of documents in a trustworthy manner, which can be used for the creation and verification of signatures.

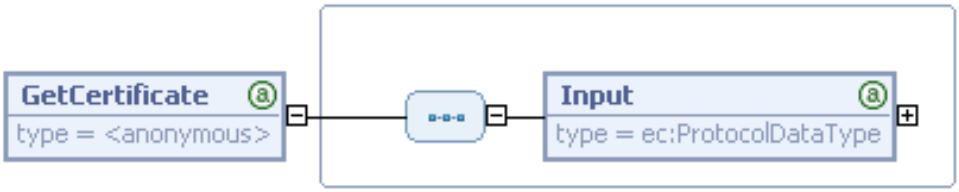
2.2.3 Encryption functions

- The `EncryptRequest` function enables encryption of data in accordance with [XMLEnc] or [RFC3369].
- The `DecryptRequest` function enables decryption of data encrypted in accordance with [XMLEnc] or [RFC3369].

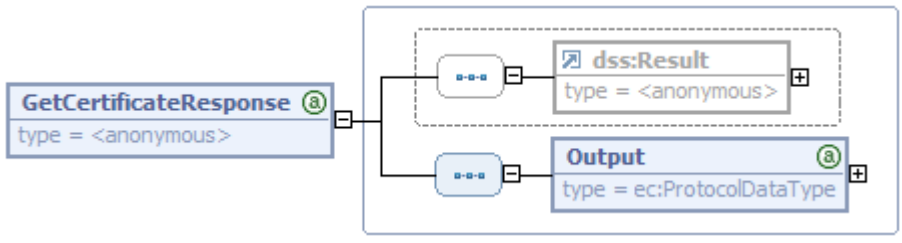
3 Specification of the eCard-Interface

3.1 Functions for identity management

3.1.1 GetCertificate

<table>
<tr><td>Name</td><td colspan="2"><code>GetCertificate</code></td></tr>
<tr><td>Description</td><td colspan="2">The <code>GetCertificate</code> function is used to request and obtain certificates. A wide range of protocols can be used for this purpose. Please refer to [TR-03112-7] for protocol specifications.</td></tr>
<tr><td>Invocation parameters</td><td colspan="2"> 

Invocation of the <code>GetCertificate</code> function.
<table>
<tr><th>Name</th><th>Description</th></tr>
<tr><td><code>Input</code></td><td>Contains the protocol's input parameters and is of the abstract <code>ProtocolDataType</code>, which is defined as follows:
<pre>
<complexType name="ProtocolDataType" abstract="true">
  <complexContent>
    <extension base="anyType">
      <attribute name="Protocol" type="anyURI"
use="required" />
    </extension>
  </complexContent>

</complexType>
</pre>
The input format depends on the protocol used for certificate enquiries (also refer to [TR-03112-7]).</td></tr>
</table></td></tr>
<tr><td>Return</td><td colspan="2"> 

Return of the <code>CardUpdate</code> function.
<table>
<tr><th>Name</th><th>Description</th></tr>
<tr><td><code>dss:Result</code></td><td>Contains the status information and the errors of an executed action. This element is described in more detail below.</td></tr>
</table></td></tr>
</table>

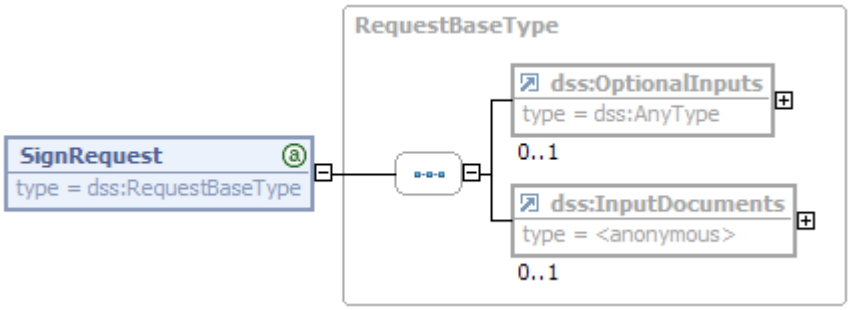
	`Output`	Contains the protocol's output parameters and is of the abstract `ProtocolDataType` (see above). The output format depends on the protocol used for certificate enquiries (also refer to [TR-03112-7]).
	Status information and errors with `GetCertificate` (also refer to [TR-03112-1] Sections 4.1 and 4.2).	
	Name	**Error codes**
	`ResultMajor`	• /resultmajor#ok • /resultmajor#error • /resultmajor#warning
	`ResultMinor`	• /resultminor/al/common#noPermission • /resultminor/al/common#internalError • /resultminor/al/common#parameterError In addition, other specific protocol error messages MAY exist.
	`ResultMessage`	MAY contain more detailed information on the occurred error if required.
Precondition		
Postcondition		
Note		

3.2 Signature functions

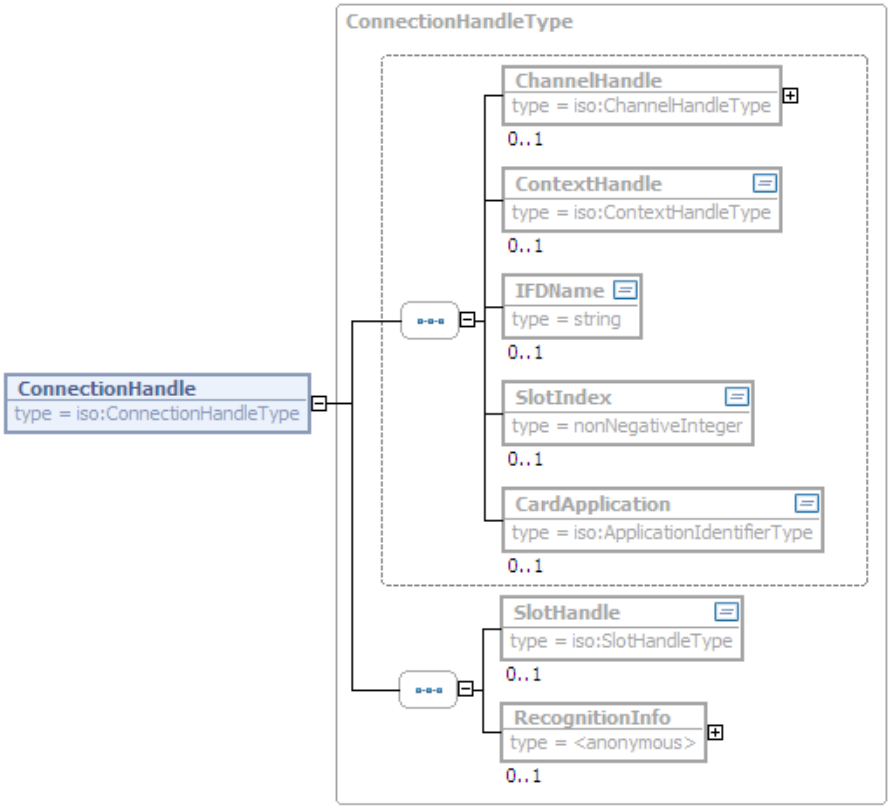
3.2.1 SignRequest

Name	**`SignRequest`**
Description	The `SignRequest` function conforms largely[1] with [DSS], [AdES], [SigGer] and [SigPol] and serves to create (qualified) electronic signatures or time stamps for transmitted documents.

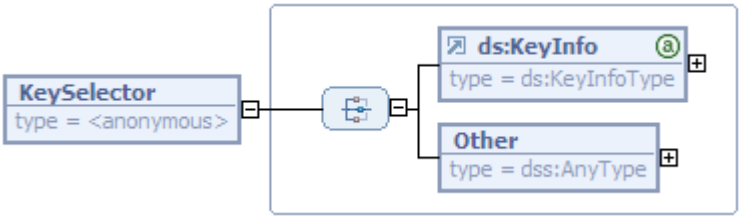
1 Deviations are due to the resolution of restrictions which seem to be unnecessary. For example, according to [DSS] (refer to section 3.2) only one `dss:SignatureObject` may be returned and the return of `dss:Timestamp` elements is not permitted in accordance with [AdES] (refer to section 3.4.1.2). The necessity of these restrictions is currently being discussed in the OASIS DSS-X working group.

<table>
<tr><td>Description</td><td>


Invocation of the <code>SignRequest</code> function
<table>
<tr><th>Name</th><th>Description</th></tr>
<tr><td><code>dss:OptionalInputs</code></td><td>MAY contain any or all of the following elements, for which detailed information is provided below:
ConnectionHandle
KeySelector
GenerateUnderSignaturePolicy
ReturnSupportedSignaturePolicies
SignatureForm
SignatureType
Properties
IncludeEContent
<code>IncludeObject</code>
SignaturePlacement
Schemas
TrustedViewerInfo</td></tr>
<tr><td><code>dss:InputDocuments</code></td><td>If a signature is to be generated this element MUST contain one or more <code>dss:Document</code> elements (refer to [DSS], Section 2.4.2).
Note that according to [SigGer] one MAY NOT use elements of type <code>dss:DocumentHash</code> if (qualified) electronic signatures are to be generated. Therefore, no signature is generated in this case, and instead the error message /resultminor/il/signature#documentHashForSignature is returned.
The <code>dss:DocumentHash</code> option MAY therefore ONLY be used for requesting time stamps.</td></tr>
</table>
</td></tr>
</table>



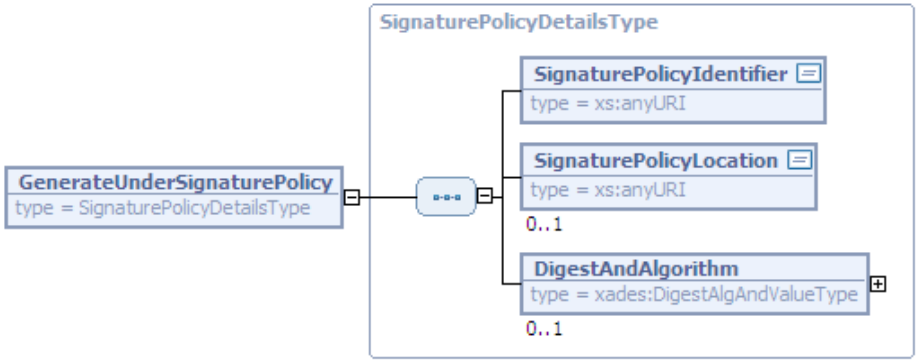
The `ConnectionHandle`-element MAY appear in `dss:OptionalInputs`. It contains a handle with which the connection to a card application can be addressed. If it is up to the eCard-API-Framework to choose an appropriate card application this element MAY be omitted. The `ConnectionHandleType` is defined and explained in [TR-03112-4].



The `KeySelector`-element MAY appear in `dss:OptionalInputs`. Addresses the key used for generating the signature. If it is up to the eCard-API-Framework to choose an appropriate key this element MAY be omitted. The `KeySelector`-element is defined and explained in [DSS] (Section 3.5.4).

In order to address a Differential Identity (DID) in a connected card application (cf. [ISO24727-3] and [TR-03112-4]) specified by the `ConnectionHandle`-element above the following two elements appear as child-element of `Other`:

- `DIDName` – Contains the name of the DID which is to be used for generating the signature.
- `DIDScope` – MAY be used to resolve any ambiguity between local and global DIDs with the same name.

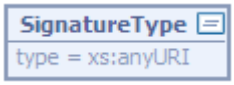


The `GenerateUnderSignaturePolicy`-element MAY appear in `dss:OptionalInputs` and is defined and explained in [SigPol]. As explained in [SigPol] this element specifies the signature policy under which the signature is to be generated.

While the eCard-API-Framework SHOULD be implemented in a way such that the set of supported signature policies can be easily extended, at least the signature policies defined in [gemKon] Annex A MUST be supported.

The `ReturnSupportedSignaturePolicies`-element MAY appear in `dss:OptionalInputs` and is defined and explained in [SigPol]. As explained in [SigPol] this element is used to ask for the set of supported signature policies.

	 The `SignatureForm`-element MAY appear in `dss:OptionalInputs` and is defined and explained in [AdES]. If the `SignatureType`–element defined below is urn:ietf:rfc:3275 or urn:ietf:rfc:3369 the `SignatureForm`-element, can be used to specify more precisely which form of the advanced electronic signature is to be generated according to [XAdES] or [TS101733] for XML and CMS signatures. With other `SignatureTypes` a warning /resultminor/il/signature#signatureTypeDoesNotSupportSignatureFormClarificationWarning is returned. The URI specified in Section 7.1 of [AdES] MUST be used for specification of the `SignatureForm`. Other URIs produce an error message /resultminor/il/signature#unknownSignatureForm.



The `SignatureType`-element MAY appear in `dss:OptionalInputs` and is defined in [DSS].

As explained in [DSS] (Section 3.5.1) it is used to specify the type of signature or time stamp, which is to be created. The following types of signatures and time stamps are supported:

1. Signature types

- **XML signature**. If the URI urn:ietf:rfc:3275 is transmitted, the generation of an XML signature is initiated in accordance with [RFC3275] (or in connection with the `SignatureForm` described above in accordance with [XAdES]). Such a signature is returned as a `ds:Signature` element.
- **CMS signature**. If the URI urn:ietf:rfc:3369 is transmitted, a CMS signature according to [RFC3369] (or in connection with the `SignatureForm` described above in accordance with [TS101733]) is requested, whereby the signature is returned as a `dss:Base64Signature` with the URI stated above as `Type`.
- **PDF signature**. If the URI http://ns.adobe.com/pdf is transmitted, an integrated PDF signature is initiated in accordance with [PDF], whereby the signature is returned as `dss:Base64Signature` with the URI stated above as `Type`. If the transmitted document is not a `Base64Data` element with MIME type "application/pdf", an error /resultminor/il/signature#PDFSignatureForNonPDFDocument is returned.

2. Time stamp types

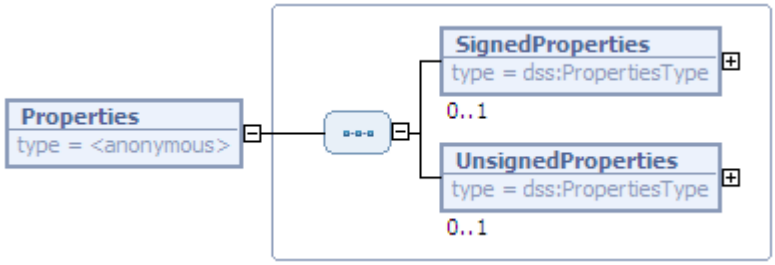
All time stamps are returned as a `dss:Timestamp` element in accordance with [DSS] Section 5.1, whereby the eCard-API-Framework creates the requested time stamp itself or MAY use an external time stamping service depending on the default configuration (also refer to [TR-03112-3]). In this context, it is necessary to distinguish between the following cases:

- **RFC3161 time stamp**. If the URI urn:ietf:rfc:3161 is transmitted, the creation of a time stamp for each transmitted document is initiated in accordance with [RFC3161] and returned in the child element `RFC3161TimeStampToken` of `Timestamp`.
- **XML time stamp**. If the URI urn:oasis:names:tc:dss:1.0:core:schema:XMLTimeStampToken is transmitted, the creation of an XML-based time stamp according to [DSS] Section 5.1.1 is initiated and the time stamp is returned as a `ds:Signature` element.

- **RFC4998 archive time stamp**. If the URI urn:ietf:rfc:4998 is transmitted, a single `ArchiveTimeStamp` is created from the transmitted documents or hash values in accordance with [RFC4998] and saved in a child element `RFC4998ArchiveTimeStamp` of `Other` type `base64Binary` with MIME type "application/ers".

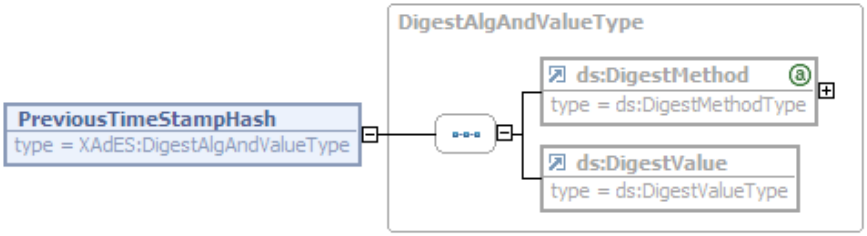
Other `SignatureType` information results in an error message /resultminor/il/signature#signatureFormatNotSupported.

If the element is missing, the default behaviour is implemented (also refer to [TR-03112-3]).



The `Properties`-element MAY appear in `dss:OptionalInputs` and is defined in [DSS].

As explained in [DSS] (Section 3.5.5) it may contain instructions for inserting signed and non-signed attributes (refer to [DSS], Section 3.5.5).
In addition to the cases described in [AdES] Section 3.3.1.1.2.3, the URI `http://www.bsi.bund.de/ecard/api/1.1/properties/previousTimeStampHash` MUST be supported for the insertion of a hash value of a previously generated time stamp into a signed attribute. For this purpose the element `PreviousTimeStampHash`



of type `XAdES:DigestAlgAndValueType` defined in [XAdES] is inserted, whereby the hash value is created over the `TimeStampToken` or the `Signature` element. Note that in the latter case the canonicalization algorithm, which is used for creating the signature MUST be applied before the hash calculation takes place.

As a result it can be proven that the signature was created *after* the time stated in the time stamp.

The time stamp to be included in the signature MAY be transmitted in the form of a `dss:Timestamp` element in accordance with [DSS] Section 5.1 or provided by the eCard-API-Framework itself.

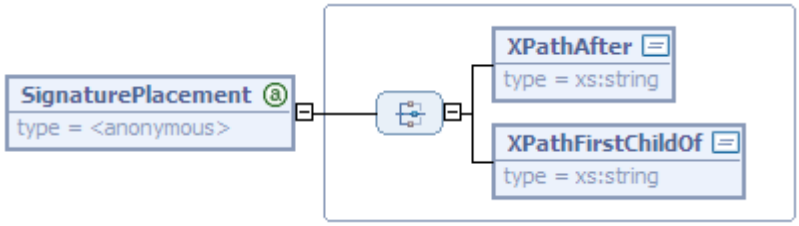
The `IncludeEContent`-element MAY appear in `dss:OptionalInputs` and is defined in [DSS].

As explained in [DSS] (Section 3.5.7) it states that the document shall be inserted into the CMS-signature. With time stamps (according to [RFC3161] or [DSS] Section 5.1), XML signatures or PDF signatures, this element is ignored and a warning /resultminor/il/signature#unableToIncludeEContentWarning is returned.

The `IncludeObject`-element MAY appear multiple times in `dss:OptionalInputs` if an XML-signature according to [RFC3275] is requested (cf. SignatureType-element above). This element is defined and explained in [DSS] (Section 3.5.6).

This element points to an object, which is transmitted in the `InputDocuments` element and shall be included in the signature.

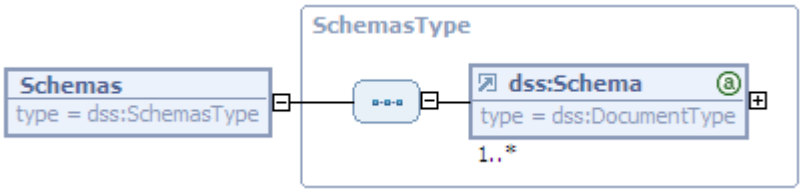
If the element is provided and a different signature type requested, this element is ignored and a warning /resultminor/il/signature#includeObjectOnlyForXMLSignatureAllowedWarning is returned.



The `SignaturePlacement`-element MAY appear in `dss:OptionalInputs` and is defined in [DSS] (Section 3.5.8).

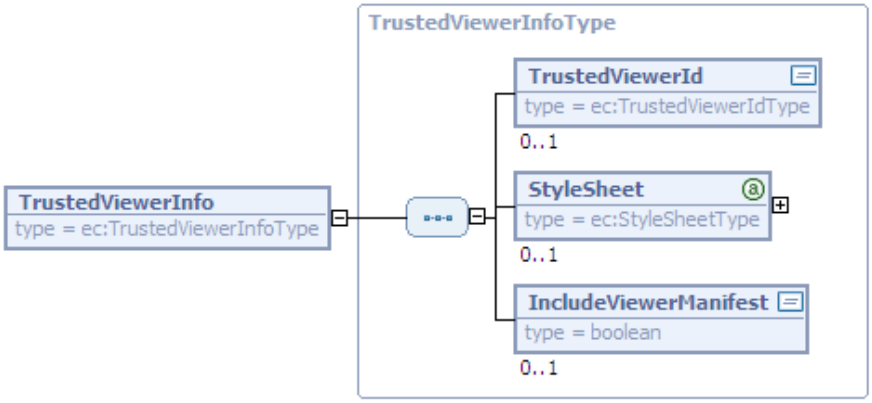
With this optional element, positioning of the signature in the document MAY be specified for XML based signatures in accordance with [RFC3275] and XML time stamps in accordance with [DSS] Section 5.1 (for details refer to [DSS] Section 3.5.8). With other signature types the element is ignored and a warning /resultminor/il/signature#ignoredSignaturePlacementFlagWarning is returned.

If the element is missing, the signature is inserted as an additional node at the end of the document (directly in front of the document's end tag).



The `Schemas`-element MAY appear in `dss:OptionalInputs` and is defined in [DSS] (Section 2.8.5).

It contains a number of XML schemata which can be used for validation of the transmitted XML documents (for details refer to [DSS], Section 2.8.5). If this element is missing, the configured default schemata are used for validation (also refer to [TR-03112-3]).

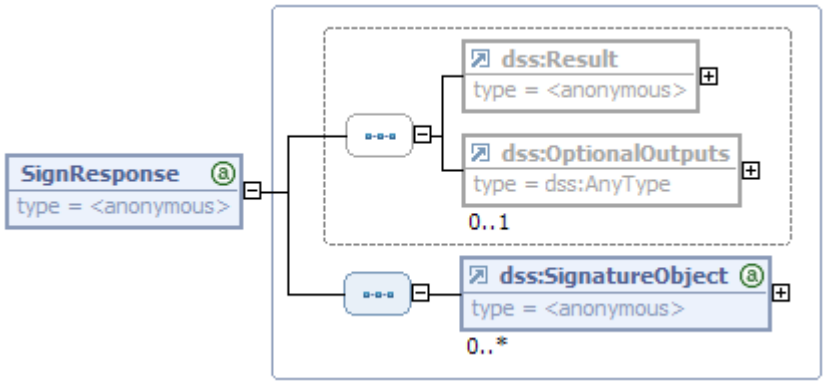


The `TrustedViewerInfo`-element MAY appear in `dss:OptionalInputs` and is described below.

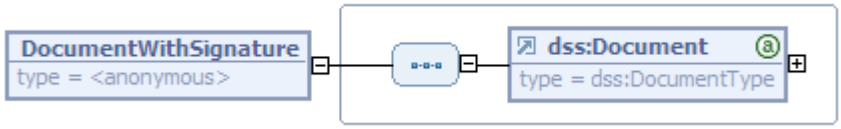
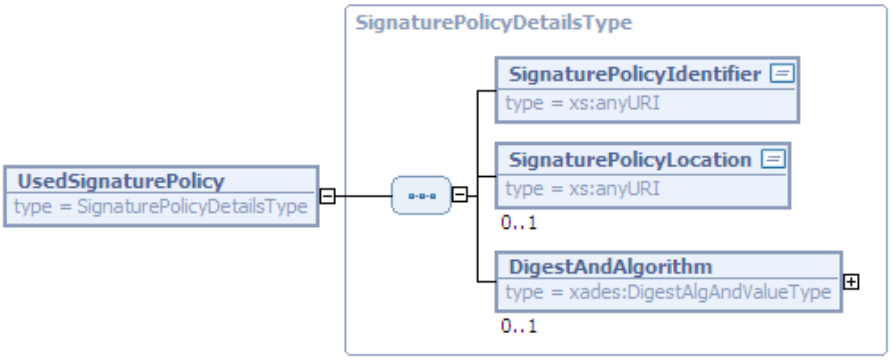
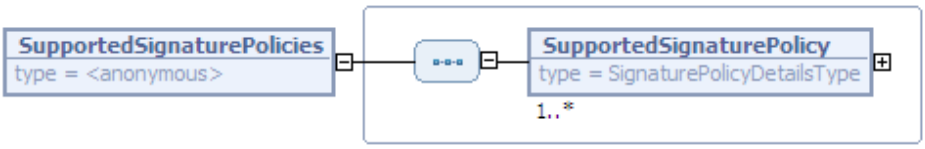
If this element is present the document(s) transmitted in the `InputDocuments`-element MUST be displayed in a trusted viewer before signing. If this element is missing, no trusted viewer is invoked.

Name	Description
`TrustedViewerId`	States which trusted viewer is to be used for displaying the documents, which are to be signed. If the element is missing, the viewer configured in `DefaultSignOptions` is used (also refer to [TR-03112-3]).
`StyleSheet`	Contains a stylesheet which is to be used for visualisation of XML documents.

<table>
<tr><td></td><td>IncludeViewerManifest</td><td>In the case of an XML signature and visualisation of the document to be signed in a stylesheet as described in [gemKon] (Section 5.4.6.3.1 and Annex A) in more detail, this states whether a reference to this stylesheet shall be inserted into the signature as a signature manifest. If the element is missing, or if it has the value TRUE, the style sheet reference is inserted as a signature manifest.

If the element is FALSE or if a CMS based signature should be generated, no reference to the trusted viewer or any used style sheet is included in the signature.</td></tr>
<tr><td>Return</td><td colspan="2"> 

SignResponse is the response to the SignRequest invocation
<table>
<tr><th>Name</th><th>Description</th></tr>
<tr><td>dss:Result</td><td>Contains the status information and the errors of an executed action. This element is described in more detail below.</td></tr>
<tr><td>dss:OptionalOutputs</td><td>MAY contain optional output elements. Depending on the dss:OptionalInputs element (see page 10) the following optional output elements MAY appear:
DocumentWithSignature
UsedSignaturePolicy
SupportedSignaturePolicies</td></tr>
</table></td></tr>
</table>

	`dss:SignatureObject`	In case of success this element contains the generated signatures or time stamps in the form of one or more `dss:SignatureObject` elements (refer to [DSS] Section 3.2 for details). Unlike in [DSS] this element MAY appear multiple times such that it is possible to implement batch signature scenarios as specified in [TR-03114].
	 The `DocumentWithSignature`-element MAY appear multiple times in `dss:OptionalOutputs` if the generation of enveloped XML signatures or PDF signatures was requested. This element is defined and explained in [DSS] (Section 3.5.8). In this case the `dss:SignaturePtr` alternative in `dss:SignatureObject` (also refer to [DSS] Section 2.5) MUST be used to provide a reference to the signatures contained in the documents.	
	 The `UsedSignaturePolicy`-element appears in `dss:OptionalOutputs` if the `GenerateUnderSignaturePolicy`-element (see page 12) was provided in `dss:OptionalInputs`. Please refer to [SigPol] for more details.	
	 The `SupportedSignaturePolicies`-element appears in `dss:OptionalOutputs` if the `ReturnSupportedSignature Policies`-element (see page 12) was provided in `dss:OptionalInputs`. Please refer to [SigPol] for more details.	

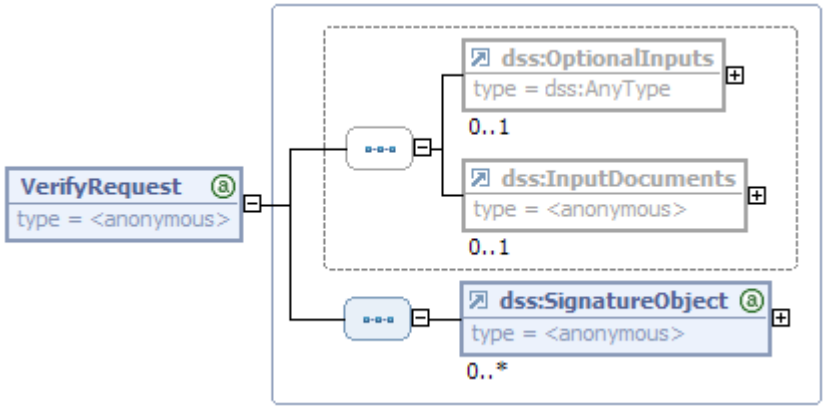
	Status information and errors with `SignResponse` (also refer to [TR-03112-1] Sections 4.1 and 4.2).	
	Name	**Error code**
	`ResultMajor`	• /resultmajor#ok • /resultmajor#error • /resultmajor#warning

	ResultMinor	• /resultminor/al/common#noPermission • /resultminor/al/common#internalError • /resultminor/al/common#parameterError • /resultminor/dp#unknownChannelHandle • /resultminor/dp#communicationError • /resultminor/dp#trustedChannelEstablishmentFailed • /resultminor/dp#unknownProtocol • /resultminor/dp#unknownWebserviceBinding • /resultminor/sal#unknownDIDName • /resultminor/sal#unknownDataSetName • /resultminor/sal#unknownDSIName • /resultminor/il/signature#signatureFormatNotSupported • /resultminor/il/signature#PDFSignatureForNonPDFDocument • /resultminor/il/signature#unableToIncludeEContent • /resultminor/il/signature#ignoredSignaturePlacementFlag • /resultminor/il/signature#certificateNotFound • /resultminor/il/service#timeStampServiceUnreachable • /resultminor/il/signature#resolutionOfObjectReferenceImpossible • /resultminor/il/signature#transformationAlgorithmNotSupported • /resultminor/il/signature#unknownViewer • /resultminor/il/signature#signatureTypeDoesNotSupportSignatureFormClarificationWarning • /resultminor/il/signature#unknownSignatureForm • /resultminor/il/signature#includeObjectOnlyForXMLSignatureAllowedWarning • /resultminor/il/algorithm#hashAlgorithmNotSupported • /resultminor/il/signature#hashAlgorithmNotSuitable • /resultminor/il/algorithm#signatureAlgorithmNotSupported • /resultminor/il/signature#signatureAlgorithmNotSuitable

	`ResultMessage`	MAY contain more detailed information on the error that occurred if required.
Precondition	The `ConnectionHandle` MAY address a linked card application or a signature service. In the first case, the respective DID and a corresponding authorisation for use of the key MUST be provided or be obtainable by implicitly initiated authentication steps with `DIDAuthenticate` (also refer to [TR-03112-4]).	
Postcondition	Signatures or time stamps are created for the transmitted documents in accordance with the transmitted child elements of `dss:OptionalInputs` and returned in `dss:SignatureObject` or `dss:DocumentWithSignature` elements.	
Note	The `SignRequest` function invokes the functions `Sign, Hash` and, if applicable (for reading the certificates to be included in the signatures) `DataSetSelect` and `DSIRead` (also refer to [ISO24727-3] and [TR-03112-4]) and, if required, the `ShowViewer` function (refer to Section 3.2.3). Note that the eCard-API-Framework MUST return a warning message (... `{hash/signature}AlgorithmNotSuitable`), if the applied algorithms do not fulfil the requirements for qualified electronic signatures as defined by the BSI (Federal Office for Information Security) and the Bundesnetzagentur (Federal Network Agency).	

3.2.2 VerifyRequest

Name	**`VerifyRequest`**
Description	The `VerifyRequest` function is used to verify signed objects (signatures, time stamps, certificates, etc.). In some circumstances, a number of different verification operations must be performed. Depending on the transmitted `dss:OptionalInputs` or the configured default `VerifyOptions` (refer to [TR-03112-3]) the results of these individual verification steps MAY be returned.

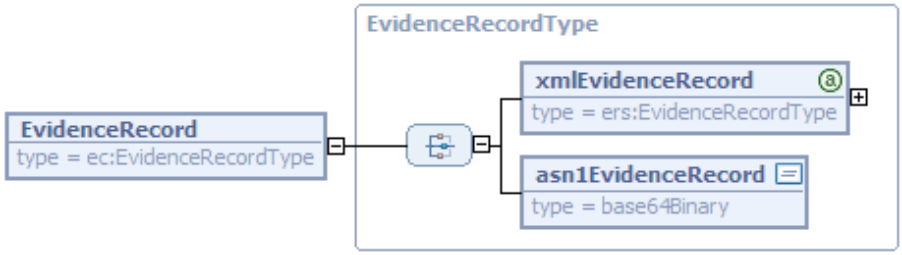
<table>
<tr><td>Invocation parameters</td><td>


Invocation of the <code>VerifyRequest</code> function
<table>
<tr><th>Name</th><th>Description</th></tr>
<tr><td><code>dss:OptionalInputs</code></td><td>MAY contain any or all of the following elements, for which detailed information is provided below:
<code>VerifyManifests</code>
<code>UseVerificationTime</code>
<code>AdditionalKeyInfo</code>
<code>ReturnUpdatedSignature</code>
<code>VerifyUnderSignaturePolicy</code>
ReturnVerificationReport</td></tr>
</table>
</td></tr>
</table>

	`dss:InputDocuments`	MAY contain the documents required for verification of the signatures or time stamps if the respective documents are not part of the signatures transmitted in `dss:SignatureObject`. This element MAY also contain XML-signatures according to [RFC3275] wrapped in a `dss:Document`-element with a child element `dss:Base64XML`- or `dss:EscapedXML`. In this case there MUST be a corresponding `dss:SignaturePtr`-element which indicates the presence of such an XML-signature. This option is necessary to avoid verification failures due to namespace rewriting (please refer to the note on page 39 of [DSS]). Details on the `dss:InputDocuments`-element can be found in Section 2.4 of [DSS].

	dss:SignatureObject[2]	Contains the signed object which is to be verified. The following signed objects MUST be supported: • XML-based signatures according to [RFC3275] (and possibly [XAdES]) indicated by a dss:SignaturePointer-element, which points to a ds:Signature-element wrapped in a dss:Base64XML- or dss:EscapedXML-element inside the dss:InputDocuments-element specified above, • a time stamp according to [RFC3161] or [DSS] (Section 5.1.1) in a single dss:Timestamp-element, • CMS-based signatures according to [RFC3369] (and possibly [TS101733]) in the dss:Base64Signature-element, • Certificates (e.g. according to [RFC3280] or [RFC3281]) in a child-element CertificateValues (cf. [XAdES]) of the Other-element, • OCSP-Responses according to [RFC2560] and CRLs according to [RFC3280] in a child-element RevocationValues (cf. [XAdES]) of the Other-element, • an Evidence Record according to [RFC4998] or [RFC6283] in a child-element EvidenceRecord (see below) of the Other-element, which protects the content of all dss:Document-elements provided in the dss:InputDocuments-element above.

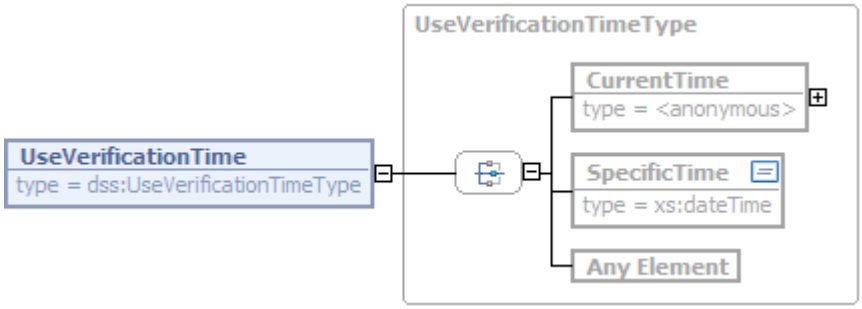
2 Note that unlike in the VerifyRequest specified in [DSS] the dss:SignatureObject-element MAY in case of non-detached signatures, certificates or OCSP-responses appear multiple times here such that it is possible to verify a batch of signed objects with a single request. For the verification of a detached signature, a time-stamp or an evidence record there MUST exactly be one dss:SignatureObject or an error (/resultminor/al/common#parameterError) is returned.



The `EvidenceRecord`-element MAY appear as child-element of the `Other`-element within `dss:SignatureObject` and contains an evidence record according to [RFC4998] and [RFC6283].

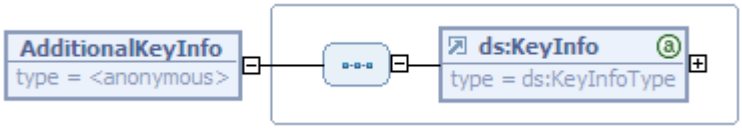
Name	Description
`xmlEvidenceRecord`	Is an evidence record according to [RFC6283].
`asn1EvidenceRecord`	Is an evidence record according to [RFC4998].

The `VerifyManifests`-element MAY appear in `dss:OptionalInputs` and is defined in [DSS] (Section 4.5.1). The presence of this element instructs the eCard-API-Framework to validate manifests in an XML signature.



The `UseVerificationTime`-element MAY appear in `dss:OptionalInputs` and is defined in [DSS] (Section 4.5.2). The presence of this element instructs the eCard-API-Framework to use the specified time to verify the signature.

If this element is missing, the verification time is either determined from an existing time stamp or another trustworthy time after the creation date (so-called assumed creation time). If such information is missing, the current time MUST be taken as the verification time. In this case, however, the verification data must be supplemented with trustworthy time information (time stamp or statement of time) on which subsequent verification can be based, and which then provides the same verification result.

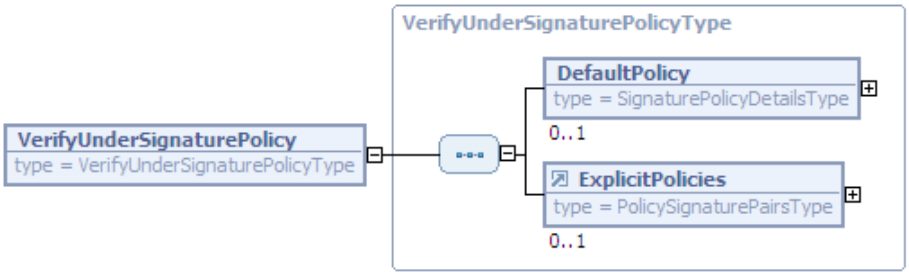


The `AdditionalKeyInfo`-element MAY appear in `dss:OptionalInputs` and is defined in [DSS] (Section 4.5.4).

This element provides the eCard-API-Framework with additional data (such as certificates and CRLs) which it can use to validate the signature.

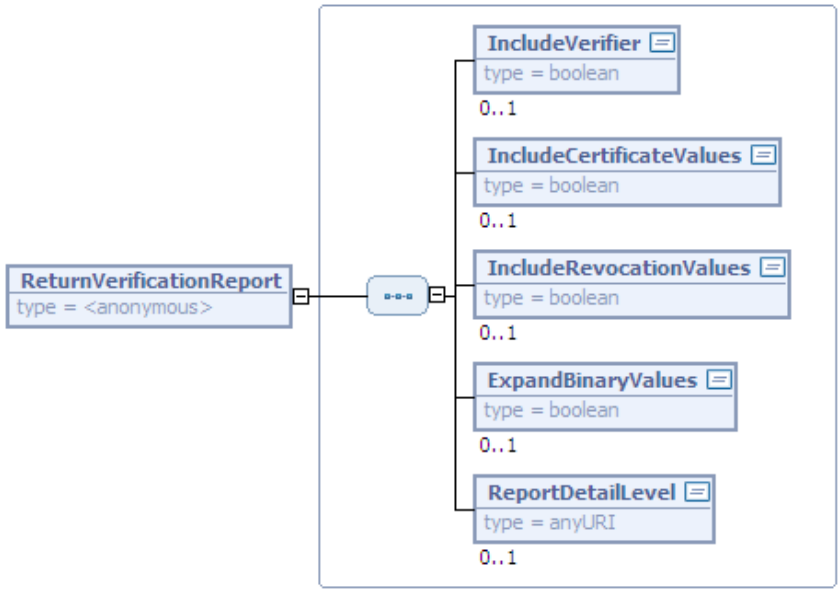
The `ReturnUpdatedSignature`-element MAY appear in `dss:OptionalInputs` and is defined in [DSS] (Section 4.5.8).

Using the optional `Type`-attribute in this element with the values defined in [AdES] (Section 7.1, Table 1) it is possible to update a basic XML- or CMS-based signature during verification such that the result is an advanced electronic signature according to [XAdES] or [TS101733].



The `VerifyUnderSignaturePolicy`-element MAY appear in `dss:OptionalInputs` and is defined in [SigPol].

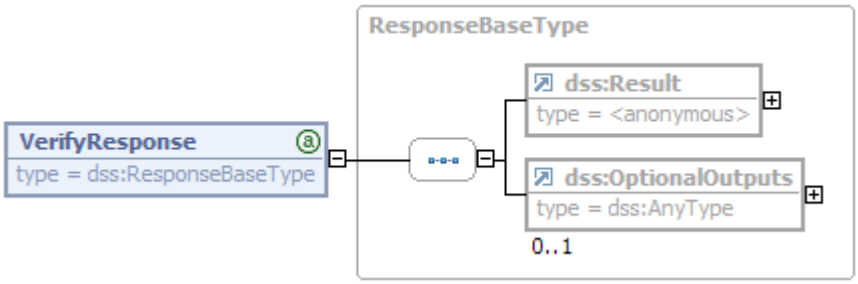
The eCard-API-Framework MUST fulfil the requirements for Conformance Level 1 defined in Section 3.1 of [SigPol] and SHOULD implement the additional requirements of Conformance Level 2.



The `ReturnVerificationReport`-element MAY appear in `dss:OptionalInputs` and is defined in [SigVer].

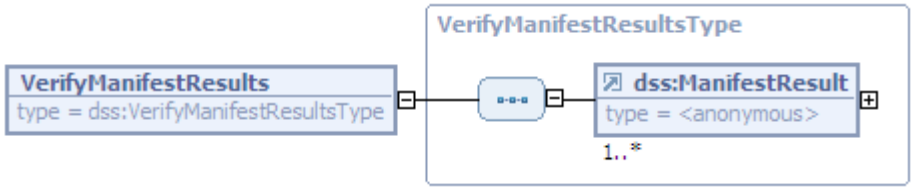
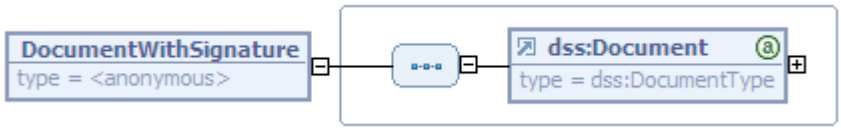
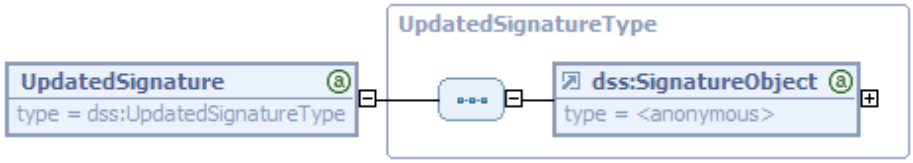
The eCard-API-Framework MUST fulfil the requirements for Conformance Level 2 (“Comprehensive”) defined in [SigVer] and SHOULD implement the additional requirements of Conformance Level 3 (“Convenient”).

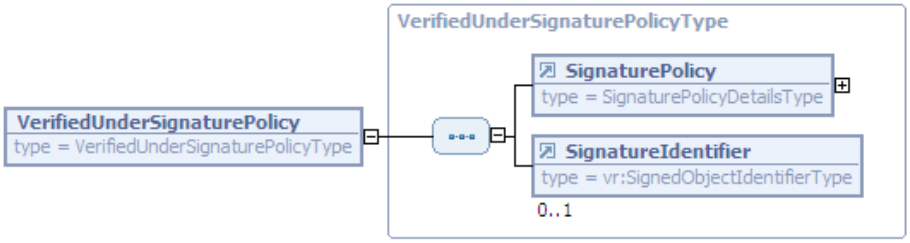
Return



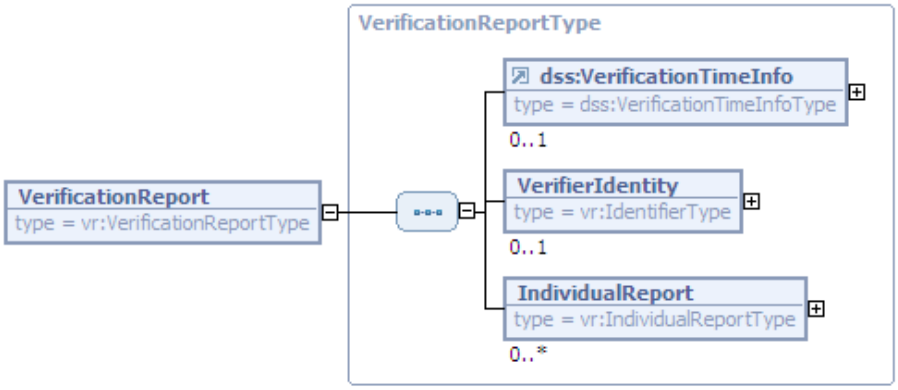
Return of the `VerifyRequest` function

Name	Description
`dss:Result`	Contains the status information and the errors of an executed action. This element is described in more detail below.

	dss:Optional Outputs	MAY contain optional output elements. Depending on the dss:OptionalInputs element (see page 23) the following optional output elements MAY appear: • VerifyManifestResults • DocumentWithSignature • UpdatedSignature • VerifiedUnderSignaturePolicy • VerificationReport
	 The VerifyManifestResults-element appears in dss:OptionalOutputs if the VerifyManifests-element (see page 26) was provided in dss:OptionalInputs. Please refer to [DSS] Section 4.5.1 for more details.	
	 The DocumentWithSignature-element appears in dss:OptionalOutputs if the ReturnUpdatedSignature-element (see page 27) was provided in dss:OptionalInputs in case an *enveloped* signature was verified. Please refer to [DSS] Section 4.5.8 for more details.	
	 The UpdatedSignature-element appears in dss:OptionalOutputs if the ReturnUpdatedSignature-element (see page 27) was provided in dss:OptionalInputs in case an *enveloping* or *detached* signature was verified. Please refer to [DSS] Section 4.5.8 for more details.	



The `VerifiedUnderSignaturePolicy`-element appears in `dss:OptionalOutputs` if the `VerifyUnderSignaturePolicy`-element (see page 27) was provided in `dss:OptionalInputs`. Please refer to [SigPol] for more details.



The `VerificationReport`-element appears in `dss:OptionalOutputs` if the `ReturnVerificationReport`-element (see page 28) was provided in `dss:OptionalInputs`. Please refer to [SigVer] for more details.

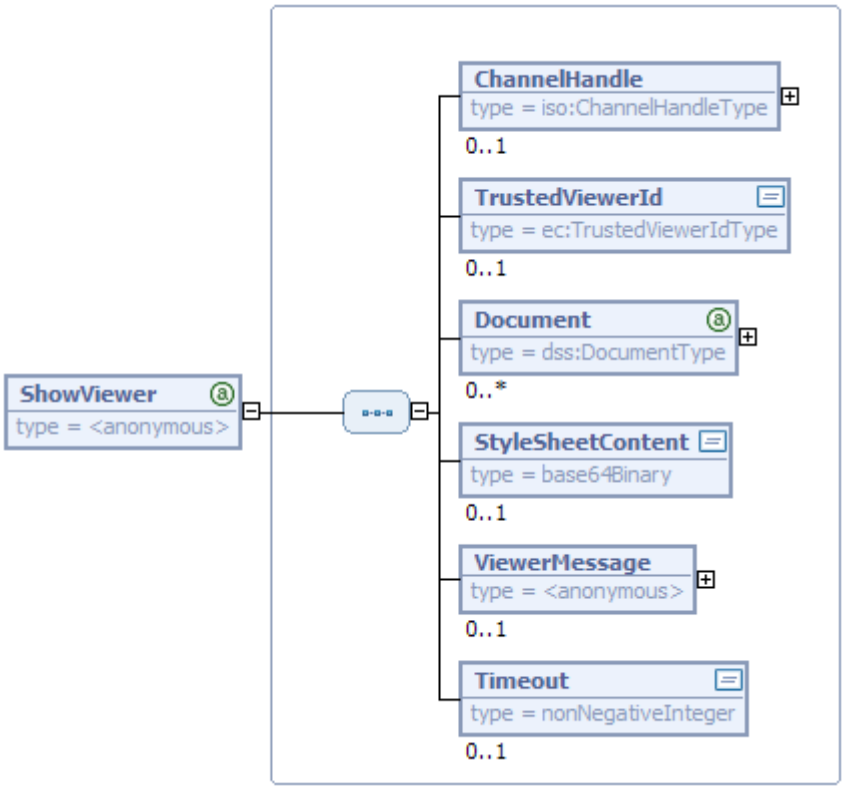
Status information and errors with `VerifyResponse` (also refer to [TR-03112-1] Sections 4.1 and 4.2).

Name	**Error codes**
`ResultMajor`	• /resultmajor#ok • /resultmajor#error • /resultmajor#warning

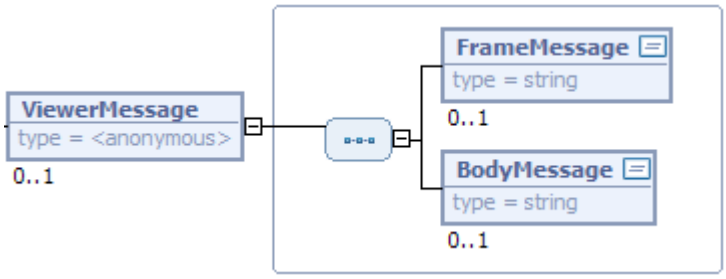
	`ResultMinor`	• /resultminor/al/common#noPermission • /resultminor/al/common#internalError • /resultminor/al/common#parameterError • /resultminor/dp#communicationError • /resultminor/il/signature# certificateNotFound • /resultminor/il/signature# certificateFormatNotCorrect • /resultminor/il/signature# invalidCertificateReference • /resultminor/il/signature# certificateChainInterrupted • /resultminor/il/signature# resolutionOfObjectReferenceImpossible • /resultminor/il/signature# transformationAlgorithmNotSupported • /resultminor/il/signature#unknownViewer • /resultminor/il/signature# certificatePathNotValidated • /resultminor/il/signature# certificateStatusNotChecked • /resultminor/il/signature# signatureManifestNotCheckedWarning • /resultminor/il/signature# suitabilityOfAlgorithmsNotChecked • /resultminor/il/signature# detachedSignatureWithoutEContent • /resultminor/il/signature# improperRevocationInformation • /resultminor/il/signature# SignatureManifestNotCorrect • /resultminor/il/algorithm# hashAlgorithmNotSupported • /resultminor/il/algorithm# signatureAlgorithmNotSupported • /resultminor/il/signature# signatureAlgorithmNotSuitable • /resultminor/il/signature# hashAlgorithmNotSuitable • /resultminor/il/signature# wrongMessageDigest • /resultminor/sal#invalidSignature

	`ResultMessage`	MAY contain more detailed information on the occurred error if required.
Precondition		
Postcondition	The signed objects transmitted in `VerifyRequest` are verified in accordance to the provided `dss:OptionalInputs`-element.	
Note	Note that the eCard-API-Framework MUST return a warning message (... `{hash/signature}AlgorithmNotSuitable`), if the algorithms used in the signature do not fulfil the requirements for qualified electronic signatures as defined by the BSI (Federal Office for Information Security) and the Bundesnetzagentur (Federal Network Agency).	

3.2.3 ShowViewer

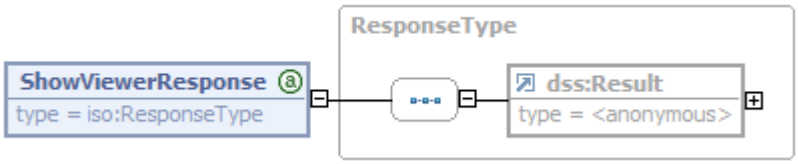
Name	**`ShowViewer`**	
Description	With the `ShowViewer` function, documents (refer to [DSS], Section 2.4.2), signed objects (refer to `dss:SignatureObject` on page 25) or corresponding verification results in form of a `VerificationReport` element according to [SigVer] MAY be displayed in a trustworthy manner. This functionality MAY, for example, be used in `SignRequest` (for displaying the signed data) or in the `VerifyRequest` function (for displaying signed objects and verification results).	
Invocation parameters	 Invocation of the `ShowViewer` function.	
	Name	**Description**

	`ChannelHandle`	Optional parameter with which a remote system can be addressed (also refer to `CardApplicationPath` in [TR-03112-4]). If the local system is to be addressed, the parameter is omitted.
	`TrustedViewerId`	Contains the unique ID of the trusted viewer used for display purposes. If this element is missing, the configured default viewer is used (also refer to [TR-03112-3]).
	`Document`	The `Document` element, which MAY occur several times, contains a document for display (for details refer to [DSS], Section 2.4.2). If this is permitted by the applicable security policy, equivalent documents MAY be shown in an overview list (also refer to [gemKon]) or only a certain random sample of the transmitted documents can be fully displayed.
	`StyleSheetContent`	An XSL stylesheet MAY be transmitted in this element which MAY be used to display XML documents. If the transmitted stylesheet is not suitable for displaying the transmitted documents, a corresponding error message /resultminor/il/viewer#unsuiteableSylesheetForDocument is returned.
	`ViewerMessage`	MAY contain additional, short messages which the trusted viewer displays in addition to the used data (see below for details). If a transmitted message is too long to be displayed by the viewer (e.g. at the top of the window), this produces the error message /resultminor/il/viewer#viewerMessageTooLong. If this element is missing, corresponding standard messages are used by the trusted viewer.
	`Timeout`	States whether the display on the viewer should be switched off automatically after a specific time (in seconds) in the event of no user interaction. If this element is missing, the display SHOULD be cancelled after 30 seconds.



With the `ViewerMessage` element the trusted viewer MAY be given additional messages for the top or body of the window.

Name	**Description**
`FrameMessage`	MAY contain a text which is displayed at the top of a window.

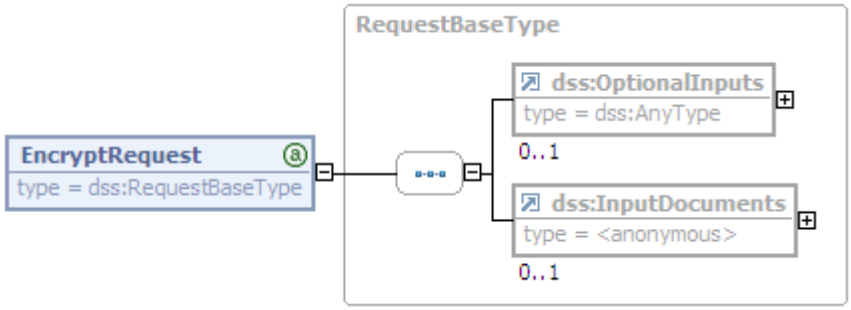
<table>
<tr><td></td><td>BodyMessage</td><td>MAY contain a text which is displayed in the body of a window.</td></tr>
<tr><td>Return</td><td colspan="2"> 

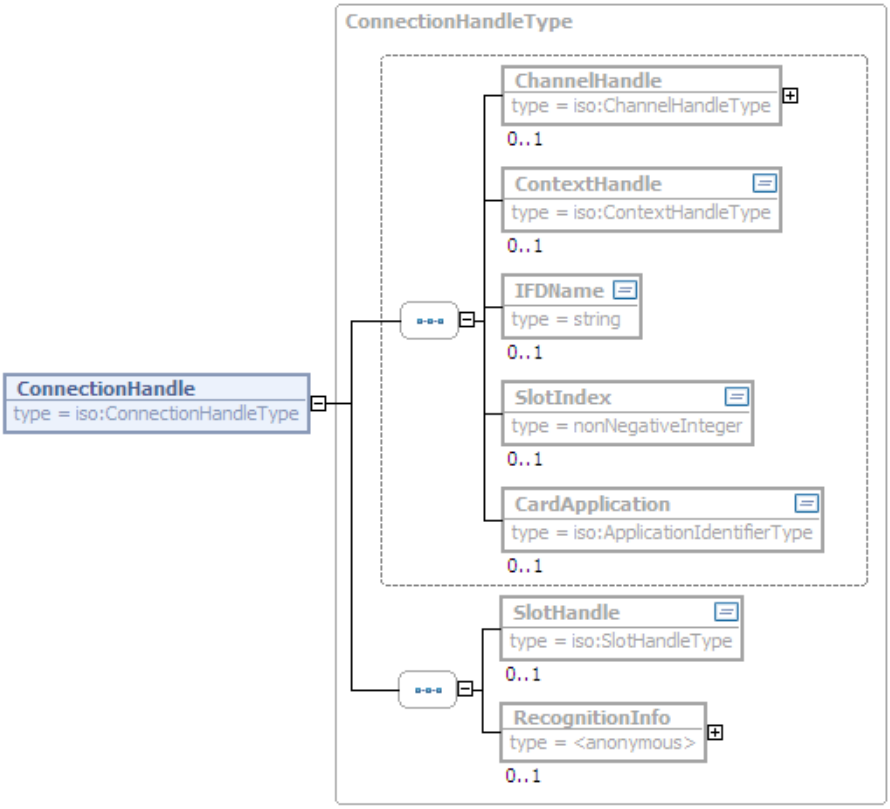
Return of the ShowViewer function.
<table>
<tr><th>Name</th><th>Description</th></tr>
<tr><td>dss:Result</td><td>Contains the status information and the errors of an executed action. This element is described in more detail below.</td></tr>
<tr><td colspan="2">Status information and errors with ShowViewerResponse (also refer to [TR-03112-1] Sections 4.1 and 4.2).
<table>
<tr><th>Name</th><th>Error code</th></tr>
<tr><td>ResultMajor</td><td>• /resultmajor#ok
• /resultmajor#error
• /resultmajor#warning</td></tr>
<tr><td>ResultMinor</td><td>• /resultminor/al/common#noPermission
• /resultminor/al/common#internalError
• /resultminor/al/common#parameterError
• /resultminor/dp#unknownChannelHandle
• /resultminor/dp#communicationError
• /resultminor/dp#trustedChannelEstablishmentFailed
• /resultminor/dp#unknownProtocol
• /resultminor/dp#unknownWebserviceBinding
• /resultminor/il/viewer#timeout
• /resultminor/il/viewer#cancelationByUser
• /resultminor/il/signature#unknownViewer
• /resultminor/il/viewer# unsuiteableSylesheetForDocument
• /resultminor/il/viewer#viewerMessageTooLong</td></tr>
<tr><td>ResultMessage</td><td>MAY contain more detailed information on the error that occurred if required.</td></tr>
</table></td></tr>
</table></td></tr>
<tr><td>Precondition</td><td colspan="2"></td></tr>
<tr><td>Postcondition</td><td colspan="2"></td></tr>
<tr><td>Note</td><td colspan="2">For security reasons this function SHOULD NOT be made available to the Client application, but only be invoked in a precisely defined context within the functions SignRequest and VerifyRequest.</td></tr>
</table>

	Note that the user interface of the eCard-API-Framework in the `ShowViewer`-function MUST provide an appropriate warning message to the user, if the algorithms related to a qualified electronic signature do not fulfil the requirements defined by the BSI (Federal Office for Information Security) and the Bundesnetzagentur (Federal Network Agency).

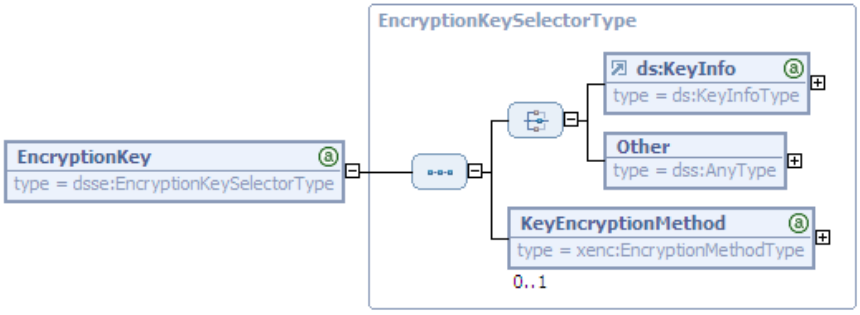
3.3 Encryption functions

3.3.1 EncryptRequest

Name	**`EncryptRequest`**	
Description	Transmitted documents are encrypted with the `EncryptDocument` function.	
Invocation parameters	 Invocation of the `EncryptRequest` function.	
	Name	**Description**
	`dss:OptionalInputs`	MAY contain any or all of the following elements, for which detailed information is provided below: • `ConnectionHandle` • `EncryptionKey` • `ContentEncryptionMethod` • EncryptionContent
	`dss:InputDocuments`	Contains a series of `dss:Document` elements, which are to be (partly) encrypted (refer to [DSS], Section 2.4.2).



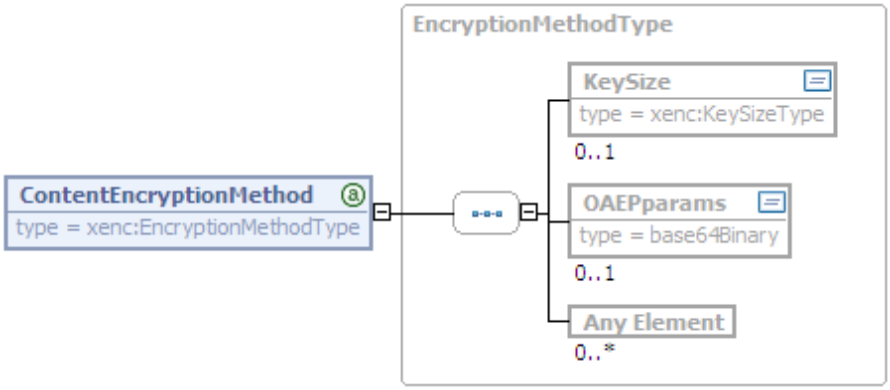
The `ConnectionHandle`-element MAY appear in `dss:OptionalInputs`. It contains a handle with which the connection to a card application is addressed. If the encryption is not performed by a smart card this element is to be omitted. The `ConnectionHandleType` is defined and explained in [TR-03112-4].



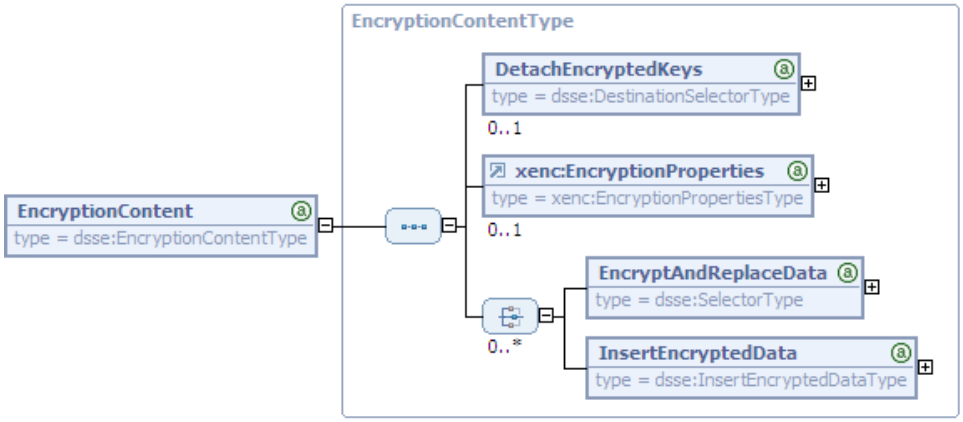
For each pair of document and recipient the `EncryptionKey`-element (refer to [SigEnc]) is included in `dss:OptionalInputs`.

Name	Description

	ds:KeyInfo	Specifies the key of the recipient. Refer to [RFC3275] for details concerning the structure of this element. Among the various possibilities at least the following two options MUST be supported: • ds:KeyValue contains a symmetric key, which serves as content encryption key used for ciphering the data and MUST be suitable for the applied ContentEncryptionMethod (see below). • ds:X509Data/ds:X509Certificate contains an X.509-certificate, which is used for encrypting the content encryption key, which is either provided in the ds:KeyValue-element mentioned above or generated at random.
	Other	Specifies the key of the recipient using some other means. This document specifies two possibilities: • In order to address a Differential Identity (DID) in a connected card application (cf. [ISO24727-3] and [TR-03112-4]) specified by the ConnectionHandle-element above the following two elements appear as child-element of Other: • DIDName – Contains the name of the DID which is to be used for generating the signature. • DIDScope – MAY be used to resolve any ambiguity between local and global DIDs with the same name. • In order to address a certificate stored on a connected card application the CertificateRef-element appears as child-element of Other. Please refer to [TR-03112-7] for details with respect to the CertificateRef-element.
	KeyEncryptionMethod	This element is optional and MAY be used to specify how the content encryption key is to be enciphered.

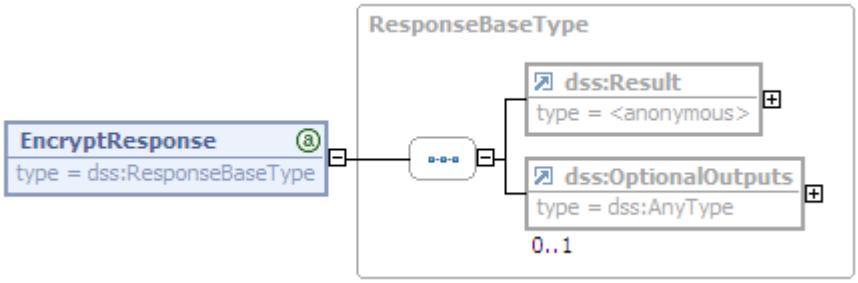


The element `ContentEncryptionMethod` MAY be included in `dss:OptionalInputs` to specify which content encryption algorithm is to be used in this request. If the element is missing, the configured `DefaultContentEncryptionMethod` is used (see [TR-03112-3]). Please refer to [XMLEnc] for details of the `EncryptionMethodType`.

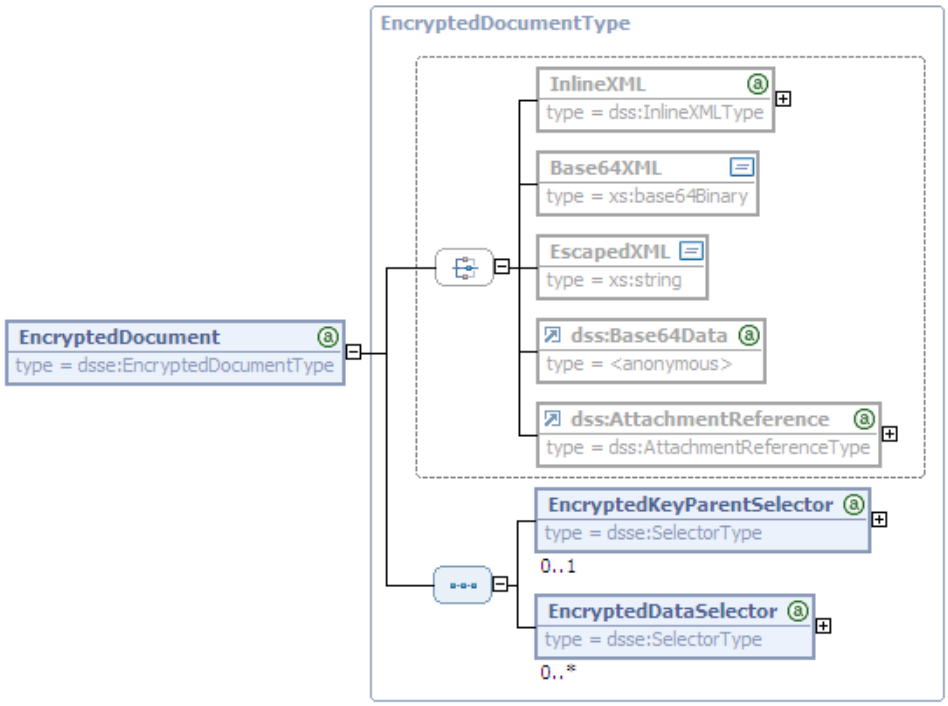


The element `EncryptionContent` MAY be used to specify details of the encryption process. Using the `EncryptionSyntax`-Attribute it is possible to specify whether a given (XML-) document is to be encrypted with [XMLEnc] or [RFC3369] for example. Please refer to [SigEnc] for more details.

Name	Description
`DetachEncryptedKeys`	MAY be used to specify where the encrypted keys shall be inserted into an encrypted XML-document. If this element is missing, the `xenc:EncryptedKey` elements will be added directly to `xenc:EncryptedData` (under `ds:KeyInfo`). If a document is to be encrypted with CMS [RFC3369] for example, this element is ignored.

<table>
<tr><td></td><td>xenc:EncryptionProperties</td><td>MAY be used to provide more information on the generation of the xenc:EncryptedData or xenc:EncryptedKey-elements. Please refer to [XMLEnc] Section 3.7 for details.</td></tr>
<tr><td></td><td>EncryptAndReplaceData</td><td>States which parts of a transmitted XML document should be encrypted. Details on the dsse:SelectorType can be found in [SigEnc].
If a document is to be encrypted with CMS [RFC3369] for example, this element is ignored.</td></tr>
<tr><td></td><td>InsertEncryptedData</td><td>References an input content to be encrypted and specifies where to insert the resulting xenc:EncryptedData within the dsse:EncryptedDocument, which is to be returned. Details on the dsse:InsertEncryptedDataType can be found in [SigEnc].
If a document is to be encrypted with CMS [RFC3369] for example, this element is ignored.</td></tr>
<tr><td>Return</td><td colspan="2"> 

The EncryptResponse element is the return of the function EncryptRequest.
<table>
<tr><th>Name</th><th>Description</th></tr>
<tr><td>dss:Result</td><td>Contains the status information and the errors of an executed action. This element is described in more detail below.</td></tr>
<tr><td>dss:OptionalOutputs</td><td>The optional element dss:OptionalOutputs contains the results of the encryption process in form of EncryptedDocument-elements.</td></tr>
</table></td></tr>
</table>



For each encrypted document an `EncryptedDocument`-element is returned in `dss:OptionalOutputs`. The `EncryptedDocumentType` is an extension of the `dss:DocumentType` (refer to [DSS], Section 2.4.2) by the two optional elements `EncryptedKeyParentSelector` and `EncryptedDataSelector` explained below. The chosen alternative for the document-format (`InlineXML`, `Base64XML` etc.) MUST be identical to the alternative provided in `dss:InputDocuments` (refer to page 35).

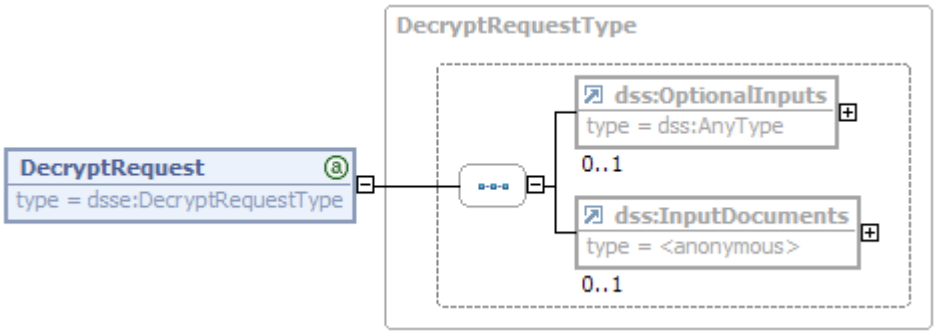
Name	Description
`EncryptedKeyParent Selector`	This optional element MAY be used to provide an XPath expression which points to the parent of the encrypted content keys (`xenc:EncryptedKey`-elements)..
`EncryptedData Selector`	This optional element MAY be used to provide XPath expressions which point to the encrypted data (`xenc:EncryptedData`) elements.

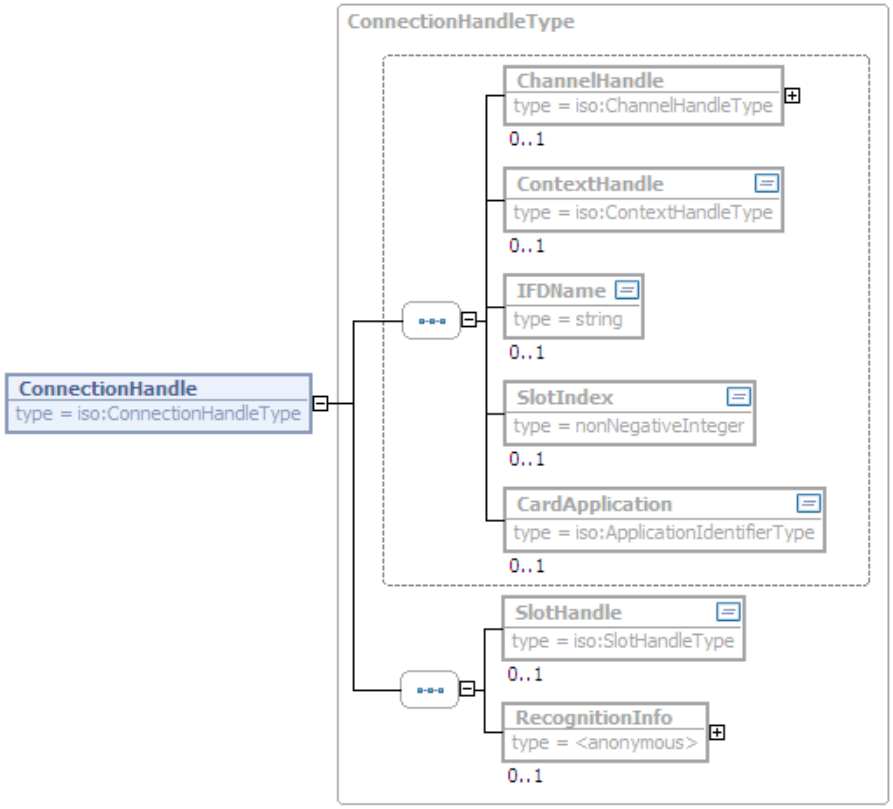
	Status information and errors with `EncryptResponse` (also refer to [TR-03112-1] Sections 4.1 and 4.2).	
	Name	**Error codes**
	`ResultMajor`	• /resultmajor#ok • /resultmajor#error • /resultmajor#warning

	ResultMinor	• /resultminor/al/common#noPermission • /resultminor/al/common#internalError • /resultminor/al/common#parameterError • /resultminor/dp#unknownChannelHandle • /resultminor/dp#communicationError • /resultminor/dp#trustedChannelEstablishmentFailed • /resultminor/dp#unknownProtocol • /resultminor/dp#unknownWebserviceBinding • /resultminor/sal#unknownDataSetName • /resultminor/sal#unknownDSIName • /resultminor/il/signature#certificateNotFound • /resultminor/il/signature#certificateFormatNotCorrect • /resultminor/il/signature#invalidCertificateReference • /resultminor/il/signature#certificateChainInterrupted • /resultminor/il/service#ocspResponderUnreachable • /resultminor/il/service#directoryServiceUnreachable • /resultminor/il/signature#certificatePathNotValidated • /resultminor/il/signature#certificateStatusNotChecked • /resultminor/sal#digitalSignatureNotCorrect • /resultminor/il/signature#signatureAlgorithmNotSuitable • /resultminor/il/signature#invalidCertificatePath • /resultminor/il/signature#certificateRevoked • /resultminor/il/signature#referenceTimeNotWithinCertificateValidityPeriod • /resultminor/il/encryption#encryptionOfCertainNodesOnlyForXMLDocuments • /resultminor/il/encryption#encryptionFormatNotSupported • /resultminor/il/encryption#invalidCertificate • /resultminor/il/key#keyGenerationNotPossible • /resultminor/il/key#encryptionAlgorithmNotSupported

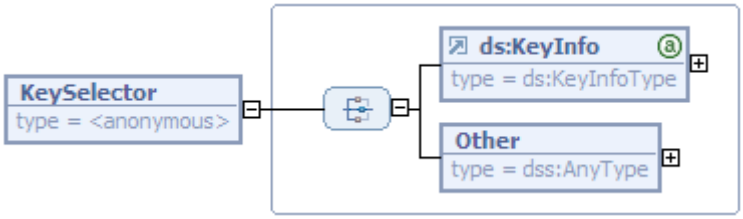
	`ResultMessage`	MAY contain more detailed information on the error that occurred if required.
Precondition	If the encryption is to be performed for or with a connected card, a corresponding, valid `ConnectionHandle` MUST exist.	
Postcondition	The encrypted documents are returned in form of `EncryptedDocument` elements.	
Note	This function MAY use the [ISO24727-3] functions `Encipher`, `DIDGet`, `DataSetSelect`, `DSIRead` and, for generation of message keys, `GetRandom` (also refer to [TR-03112-4]). Also refer to the `EncryptDocument` function in [gemKon].	

3.3.2 DecryptRequest

Name	**`DecryptRequest`**	
Description	Encrypted documents are decrypted with the `DecryptDocument` function.	
Invocation parameters	 Invocation of the `DecryptRequest` function.	
	Name	**Description**
	`dss:OptionalInputs`	MAY contain any or all of the following elements, for which detailed information is provided below: • `ConnectionHandle` • `KeySelector` If these elements are missing, the eCard-API-Framework MUST try to determine suitable keys in the connected card applications for decrypting the data. If this fails, a corresponding error /resultminor/sal#decryptionNotPossible is returned.
	`dss:InputDocuments`	Contains a sequence of `dss:Document` elements, which are to be decrypted (refer to [DSS], Section 2.4.2).



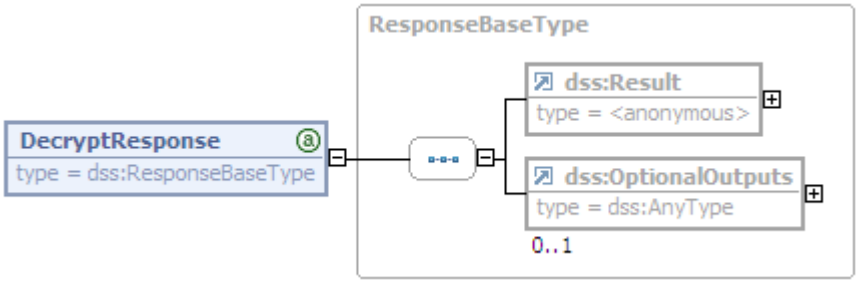
The `ConnectionHandle`-element MAY appear in `dss:OptionalInputs`. It contains a handle with which the connection to a card application is addressed. The `ConnectionHandleType` is defined and explained in [TR-03112-4].



The `KeySelector`-element MAY appear in `dss:OptionalInputs` and addresses the key used for decrypting. If it is up to the eCard-API-Framework to choose an appropriate key this element MAY be omitted. The `KeySelector`-element is defined and explained in [DSS] (Section 3.5.4).

In order to address a Differential Identity (DID) in a connected card application (cf. [ISO24727-3] and [TR-03112-4]) specified by the `ConnectionHandle`-element above the following two elements appear as child-element of `Other`:

- `DIDName` – Contains the name of the DID which is to be used for decryption.
- `DIDScope` – MAY be used to resolve any ambiguity between local and global DIDs with the same name.

<table>
<tr><td>Return</td><td>


Return of the <code>DecryptResponse</code> function.
<table>
<tr><th>Name</th><th>Description</th></tr>
<tr><td><code>dss:Result</code></td><td>Contains the status information and the errors of an executed action. This element is described in more detail below.</td></tr>
<tr><td><code>dss:OptionalOutputs</code></td><td>The element <code>dss:OptionalOutputs</code> contains the decrypted documents in form of <code>dss:Document</code>-elements (refer to [DSS], Section 2.4.2).</td></tr>
</table>
Status information and errors with <code>DecryptResponse</code> (also refer to [TR-03112-1] Sections 4.1 and 4.2).
<table>
<tr><th>Name</th><th>Error code</th></tr>
<tr><td><code>ResultMajor</code></td><td>• /resultmajor#ok
• /resultmajor#error</td></tr>
<tr><td><code>ResultMinor</code></td><td>• /resultminor/al/common#noPermission
• /resultminor/al/common#internalError
• /resultminor/al/common#parameterError
• /resultminor/dp#unknownChannelHandle
• /resultminor/dp#communicationError
• /resultminor/dp#
trustedChannelEstablishmentFailed
• /resultminor/dp#unknownProtocol
• /resultminor/dp#unknownWebserviceBinding
• /resultminor/sal#namedEntityNotFound
• /resultminor/il/encryption#
encryptionFormatNotSupported
• /resultminor/sal#decryptionNotPossible
• /resultminor/sal#securityConditionsNotSatisfied
• /resultminor/ifdl/terminal#noCard</td></tr>
<tr><td><code>ResultMessage</code></td><td>MAY contain more detailed information on the occurred error if required.</td></tr>
</table>
</td></tr>
<tr><td>Precondition</td><td>Suitable keys MUST be available to the eCard-API-Framework for decryption of</td></tr>
</table>

	the documents as differential identity on a connected card application.
Postcondition	The decrypted documents are returned.
Note	This function uses the [ISO24727-3] function `Decipher` (also refer to [TR-03112-4]). Also refer to the `DecryptDocument` function in [gemKon].

References

[SigEnc]	A-SIT: C. Orthacker: Proposal for an Encryption Profile for OASIS DSS (including schema)
[PDF]	Adobe: Portable Document Format Reference Manual
[TR-03112-1]	BSI: TR-03112-1: eCard-API-Framework – Part 1: Overview and Generic Mechanisms
[TR-03112-2]	BSI: TR-03112-2: eCard-API-Framework – Part 2: eCard-Interface
[TR-03112-3]	BSI: TR-03112-3: eCard-API-Framework – Part 3: Management-Interface
[TR-03112-4]	BSI: TR-03112-4: eCard-API-Framework – Part 4: ISO24727-3-Interface
[TR-03112-5]	BSI: TR-03112-5: eCard-API Framework – Part 5: Suppor- Interface
[TR-03112-6]	BSI: TR-03112-6: eCard-API-Framework – Part 6: IFD-Interface
[TR-03112-7]	BSI: TR-03112-7: eCard-API-Framework – Part 7: Protocols
[TR-03114]	BSI: TR-03114: Stapelsignatur mit dem Heilberufsausweis
[TS101733]	ETSI: TS 101 733: Electronic Signature Formats, Electronic Signatures and Infrastructures (ESI) – Technical Specification
[gemKon]	gematik: Connector specification
[RFC2119]	IETF: RFC 2119: S. Bradner: Key words for use in RFCs to Indicate Requirement Levels
[RFC2560]	IETF: RFC 2560: M. Myers, R. Ankney, A. Malpani, S. Galperin, C. Adams: X.509 Internet Public Key Infrastructure - Online Certificate Status Protocol – OCSP
[RFC3161]	IETF: RFC 3161: C. Adams, P. Cain, D. Pinkas, R. Zuccherato: Internet X.509 Public Key Infrastructure Time-Stamp Protocol (TSP)
[RFC3275]	IETF: RFC 3275: D. Eastlage, J. Reagle, D. Solo: (Extensible Markup Language) XMLSignature Syntax and Processing
[RFC3280]	IETF: RFC 3280: R. Housley, W. Polk, W. Ford, D. Solo: Internet X.509 Public Key Infrastructure, Certificate and Certificate Revocation List (CRL) Profile
[RFC3281]	IETF: RFC 3281: S. Farrell, R. Housley: An Internet Attribute Certificate Profile for Authorization
[RFC3369]	IETF: RFC 3369: R. Housley: Cryptographic Message Syntax (CMS)
[RFC4998]	IETF: RFC 4998: T. Gondrom, R. Brandner, U. Pordesch: Evidence Record Syntax (ERS)
[RFC6283]	IETF: RFC 6283: A. Jerman Blazic, S. Saljic, T. Gondrom: Extensible Markup Language Evidence Record Syntax
[ISO24727-3]	ISO: ISO/IEC 24727-3: Identification Cards — Integrated Circuit Cards Programming Interfaces — Part 3: Application Interface
[AdES]	OASIS: Advanced Electronic Signature Profiles of the OASIS Digital Signature Service Version 1.0
[DSS]	OASIS: Digital Signature Service Core Protocols, Elements, and Bindings
[SigGer]	OASIS: German Signature Law Profile of the OASIS Digital Signature Service
[SigVer]	OASIS: Profile for comprehensive multi-signature verification reports for OASIS Digital Signature Services

[SigPol] OASIS: Signature Policy Profile of the OASIS Digital Signature Services

[XAdES] W3C: W3C Note: XML Advanced Electronic Signatures (XAdES)

[XMLEnc] W3C: W3C Recommendation: XML Encryption Syntax and Processing